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Submerged memory

the UNESCO Courier

Contents

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Underwater remains dating back to the first century B.C. (Croatia)

SUBMERGED MEMORY

More than three million shipwrecks are lying on the ocean floor today. Hundreds of underwater decorated caves, towns and monuments remain to be discovered. How can we make use of the knowledge contained in these remains? How can they be presented to the general public? This issue of the Courier tackles these questions.

THE DEEP DIVE SYNDROME

The French writer Jean-Marie Blas de Roblès tells how he pursued his dream of uncovering "fragments of raw beauty long since forgotten" from the depths of the sea, an emotional experience very different from a treasure hunt. Between 1986 and 2001, the novelist took part in underwater archaeological excavations off the coast of Libya, exploring that "unseen part of ourselves" which must be carefully and respectfully protected. **P 3**

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THE DEEP DIVE SYNDROME

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The breathtaking excitement of finding objects underwater has nothing to do with their monetary value, writes Blas de Roblès.

It all began in 1985. Not long returned from his first terrestrial dig with the French archaeological mission in Libya – one of the privileges of friendship – Claude Sintes [Director of the Museum of Ancient Arles] wasted no time in sharing his experiences with me: coming from Apollonia, he had seen Cyrene, Sabratha and Leptis Magna – Greek and Roman remains surpassing in size everything we knew or could have imagined. He said he had no idea that whole towns lay buried under the sand of the seashore in such wondrous and magnificent settings.

But even better was the fact that hardly anyone had ever thought of exploring the seabed off this coastline. Everything was still exactly where it had been in the seventh century B.C.! Imagine the fabulous finds there might be! Ancient shipwrecks for certain – because the shores of the Gulf of Sidra had always been among the most inhospitable coastlines in the world – but also buildings swallowed up by the sea and statuary and materials of all kinds… Furthermore, he had secured permission to organize an underwater archaeological campaign for the following summer!

He dealt with the technical side himself, but there was still the question of recruitment. The Libyan regime did not license small trading operations, so it was extremely difficult to arrange for the expedition's supplies. As for the conditions of the excavations and the accommodation, they would be even worse: "Spartan" seemed rather a mild euphemism to describe the situation. Therefore, he had to be able to have a technical team in which he had complete confidence, and people he could count on to be available at all times. I had an adequate knowledge of archaeology and genuine experience of the sea, and I was used to living in confined spaces: if I wouldn't mind doing the cooking as well as working on the digs, then I would be the first recruit…

So that is how it all began. I jumped with joy when I agreed to go – I would even have done the cleaning if it had meant going with him to Libya! – but I never suspected that my contiribution, and that of all the other members of the team, would actually begin with precisely that kind of work.

In August 1986, after a three-day journey, we were ready to get down to work. The first day was spent making our site headquarters habitable. It was a dilapidated house from the Italian colonial period infested with scorpions and huge dark brown cockroaches. The next day, an initial reconnaissance of the site with mask and snorkel confirmed the observations of the American archaeologist Nicholas Flemming; as he had noted in 1957 after his first survey, the buried structures of the port of Apollonia were clearly visible and without doubt they justified the excavations we were going to undertake.

On a more personal level, they immediately prompted me to discover a universe I had hitherto believed to be the preserve of literature. In a single leap I had been transported to the worlds of Jules Verne and H.G.Wells – the worlds of Twenty Thousand Leagues under the Sea and The Time Machine came together in the joyous feeling of knowing for certain that I was swimming over the abandoned city of Atlantis!

I had come to my love of Greece through an acquaintance with the pre-Socratics, and I fell in love with Antiquity through baptism in the warm waters of Apollonia. Practised

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Claude Sintes and Jean-Marie Blas de Roblès find a statue of Dyonisius.

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in hunting with a harpoon since my early adolescence, I had regarded the depths of the sea – the fields of laminaria, the rocky caverns covered with spiky coral, the wavy formations of sand – merely as the hiding places or clearly designated locations of my prey. These all too familiar underwater landscapes assumed a phantasmagorical dimension in reality: in one direction, there would be an alignment of Cyclopean blocks dovetailed together; in another, a square tower, and beyond that banks of oars for triremes sculpted in the rock, and in two metres of water a fish tank described by Vitruvius [the 1st century B.C. Roman architect], with its fitments for octopuses and morays…

Everywhere, between each stone, each structure that was more or less discernible beneath its covering of algae, there lay visible, and easily within reach, dozens, indeed hundreds of objects that were deserving of places in museums or at least in archaeologists' archives: the bellies and bottoms of amphorae from all periods, stamped Rhodian handles from the 6th century B.C., Roman cups, broken decorative vases…

A world was lying there, set as in the aftermath of a disaster, and on display for the pleasure of those willing to take an interest in it. All that remained of Apollonia, the Greek port of ancient Cyrene sung of in olden times by Pindar or Callimachus, was a tongue of red land bristling with Byzantine columns, a theatre on a hillside and various later developments. But a few metres from the coast, awaiting visitors, was a city that had been swallowed up like Pompeii. An incredible prize for the scientist and a gift from the gods for the dreamer I have never ceased to be.

Adventure and misadventures

Underwater archaeology is of course no different from terrestrial archaeology; they use similar techniques even if underwater excavations are more complicated to undertake and require special equipment and even specific skills. In our case, the working conditions were particularly complex. In the absence of a boat we had to transport bottles and equipment to the beach on foot. To reap the most benefit from our time there we had agreed to do two dives a day. Three hours in the morning, followed by refilling the bottles on the shore, and another three hours in the afternoon. We then had to take all our equipment back to the stores, clean it and maintain it, compile an inventory of what we had found… and then cook dinner.

Including the land-based team I had about a dozen mouths to feed every evening; the mission had a container of melted cheese, powdered orange juice, spices and biscuits… As it was impossible to obtain any staples in the State shops, we bought from our Libyan friends the sugar, pasta and rice I needed to put together the stopgap recipes concocted by my mother. Although our daily menu was regularly improved by fish – the grouper we caught on Fridays – I still marvel at how we managed to avoid a general mutiny! Especially as we only had water from a tank. It was also best not to think about it too much when you had to remove the mosquito larvae from your glass before you drank from it. After dinner, there was an account of the day's digs and then we drank mint tea on the terrace, keeping an eye out for scorpions scuttling up towards the light.

In fifteen years of missions, the list of our misadventures would be enough to put anyone off contemplating a career as an archaeologist: the snake under the sheets, the scorpions in the shoes, fishing with hand-grenades not far from where we were diving, warning shots from a heavy machine-gun when we got

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too close to a restricted zone, shortness of breath in stormy seas, etc. Surprising as it may seem, none of our misadventures ever lessened the joy of taking part.

Dionysus the twice-born

After the 1986 mission our results were so encouraging that the underwater team secured permission to study the port of Leptis Magna. Prospecting the following year led to our surveying a submerged jetty, and that significantly altered our understanding of the town's importance in the Severian period [from the end of the 2nd to the beginning of the 3rd century]. Meticulous study of the port of Apollonia made it possible not only to understand the way it had developed from its Greek origins to its abandonment in the seventh century but also to determine the sinkage coefficient of the land involved in its partial engulfing. This work led to the discovery of a Hellenistic wreck and to the unearthing of innumerable pieces of pottery, coins and statuary.

My initial motivations for engaging in this kind of work included a spirit of adventure, friendship and the writings of Albert Camus [Nobel Prize for Literature, 1957] on Tipasa and Djemila [two Algerian sites on UNESCO's World Heritage List], but I was never attracted by the idea of a "treasure hunt" as such. Although I did once find a very rare gold solidus and the excitement was breathtaking, it was not at all because of the object's monetary value. It was because of the way in which this small shiny disc was spinning in the blue water, reflecting the sun like a mirror, and because of the inexpressible joy of having brought up from the depths of the sea a fragment of raw beauty long since forgotten. It is a process that is, ultimately, very close to that which is involved in writing, and of which to my mind one of the most truthful metaphors is provided by the French novelist Serge Brussolo's *Le Syndrome du scaphandrier*(The Deep Dive Syndrome) in which day after day a hunter of dreams plunges into the darkness of sleep; from this parallel universe he comes up with ectoplasms of various kinds, strange fictions which take root in reality and manage to acquire a real existence.

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"Dyonisius drunk" reconstituted.

Fifteen years on, another discovery demonstrated even better the reasons for my perseverance. During the underwater excavation of the Roman fish tanks of Apollonia, Claude Sintes and I had the good fortune to dig up a statue of Dionysus. Once we got it on to dry land it was examined and then it became clear that it matched a statuette of a satyr found in 1957, and which Nicholas Flemming is seen holding, as if it were a newborn child saved from the sea, in a photograph taken after one of his dives. Almost 50 years later we had just reconstituted a "drunken Dionysus" who had crossed the ages and seemingly given some dramatic irony to his surname "twice-born".

Archaeology renews bonds. More than any other discipline it brings together and reconciles the living who have been separated over the centuries. The sub-aquatic heritage is more directly accessible and often better preserved and more homogeneous than its terrestrial counterpart. Furthermore, it is unexplored. When we think, for example, of the still mysterious 1,500 kilometres of Libyan coast, we are readily persuaded that this invisible part of ourselves must be protected with every bit as much care and respect as the part that has already come to light.

Jean-Marie Blas de Roblès,
French writer, philosopher and archaeologist, born in Sidi-Bel-Abbès, Algeria, in 1954, is the author of *Libye grecque, romaine et byzantine* (Edisud, 2005). He received the Prix Médicis 2008 for his most recent novel *Là où les tigres sont chez eux* (Zulma, 2008).

Maritime archaeology in Denmark offers surprising insight into the life and landscapes of the early Stone Age, more than archaeology on dry land can provide. And it bears witness to the fact that climate change – a threat today to underwater heritage - is not only a modern phenomenon.

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First century BC amphorae found near Pag Island (Croatia).

TWENTY THOUSAND SITES UNDER THE SEA

Jørgen Dencker's eyes twinkle with enthusiasm as he recalls one high point of his over-30-year career in maritime archaeology. The head of the Maritime Archaeology Department at the Viking Ship Museum of Roskilde was diving in Tybrind Vig creek, some 300 meters off the coast of Western Funen. "We were carrying out an extensive submarine excavation of a Stone Age settlement when I uncovered a paddle made of ash wood. The paddle was more than 6,000 years old, but the ash was still a shiny yellow with almost black growth rings. In the soft sediments of gytja (a sort of mud) – which are practically oxygen-free - the paddle had conserved the same vivid color as 6,000 years ago, when some fisherman must have dropped it. But the exposure to daylight changed the color within minutes and the ash turned grey."

Other extraordinary discoveries of Danish maritime archaeology include an intact tomb containing the 7,000-year-old skeletons of a young woman and her child and a finely decorated paddle with a fishing line attached. These finds illustrate what an immensely rich and well preserved cultural heritage lies submerged in the Baltic Sea and inner Danish waters. These waters are riddled with sheltered small bays, creeks, straits and inlets. Here waves tend to be small, the current weak and the tide almost non-existent.

This very special geography has created ideal conservation conditions for Stone Age settlements. Organic material like bones, antlers, trees and other plant fiber – which have long disappeared from similar settlements found on land – have been preserved in the marine sediments. These underwater finds give us amazing insight into daily life and activities 6-9,000 years ago, unobtainable from digs on dry land. Since the 1970s when the first submerged settlements were investigated, some 2,000 underwater Stone Age sites have been recorded and scientists expect the total number to exceed 20,000.

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Fishing tools used today were already in use 6,000-9,000 years ago.

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Climate change: protection, then destruction

The submerged Stone Age settlements bear witness to radical changes of climate in Northern Europe. As the last Ice Age came to an end some 20,000 years ago, a huge ice cap covered today's Norway, Sweden, almost all Denmark and the northern part of the United Kingdom. Enormous masses of water were caught in the ice and the level of the sea was several hundred meters lower than today. As the temperature rose, the ice melted gradually and retreated to the North. New land emerged, to be covered by dense forest. The Baltic Sea was created as the ice melted, and some 9,000 years ago it began to run into the North Sea through the Store Belt in Denmark. At that time Denmark was still connected by land to Sweden and the UK due to the low sea level. Human settlements were located along the shorelines and as the water rose they were flooded. This explains why drowned settlements and forests are found today along former coast lines, both close to and far from present ones and at almost all water depths.

Ironically, the rich cultural heritage preserved thanks to the climate changes some 20,000 years ago is now threatened by modern climate upheavals and human induced environmental changes. Shifts in wind direction and more numerous and stronger storms modify currents and depositing conditions in the sea. Sediments that have protected submerged settlements for millenniums are now being eroded; artifacts are exposed, oxidized and destroyed by waves and currents, and quickly washed away.

Meanwhile, the massive use of fertilizers in Danish agro-business is affecting the eelgrass at the bottom of the sea, which has played an important role in the protection of ancient sub aquatic settlements. Fertilizers are drained from the fields to the sea, endangering eelgrass growth.

For Jørgen Dencker, struggling with sparse public founding and growing environmental threats, international collaboration – strengthened by the UNESCO Convention on the Protection of the Underwater Cultural Heritage, which Denmark has yet to sign – is more crucial than ever.

A prehistorical menu

"Before, we thought of Stone Age men as primitive. But today we see them as not very different from ourselves, people with an extensive knowledge of the nature in which they lived", explains Dencker.

Skeletons found in graves show that people were relatively tall and well-fed and that most of their food came from the sea. Fauna diversity was great in the sea as well as on land. New findings in the Baltic Sea show that even big fish like tuna, sturgeon and swordfish – thought to have appeared in Denmark only thousands of years later – were also caught at the time. Well-preserved leftovers in ceramic pots show that bouillabaisse was on the menu long before the existence of French gastronomy.

Fishing was well-developed and tools still common in many places today were used 6-9,500 years ago. "Discovering several hundred meters of fish fences from the later Stone Age, harpoons made of antlers and long dugout canoes brings us close to everyday life in the Stone Age", explains Dencker.

Thirty years of Danish investigation into submerged settlements has changed our perception of life during this period.

© UNESCO/NAS/S. Ward

"Seahenge", marine archeological site in the United Kingdom named after the famous Stonehenge, is more than 4000 years old. Its original use is unknown.

Niels Boel,
Danish journalist

As the world's largest island and smallest continent, Australia is relatively isolated. For tens of thousands of years Aboriginal Australians developed distinct cultures in relative stability. Major wars, invasions, mass migrations and cultural upheavals bypassed this land – at least until the 18th century.

THE KEY TO AUSTRALIAN ANCIENT HISTORY UNDER WATER?

When European explorers began arriving on Australian shores in the 1600s they attempted to describe Aboriginal Australians; this continued during the colonisation of Australia from 1788. But Aboriginal languages, artistic representations of their reality and Aboriginal relationship to the land meant nothing to the new arrivals. The cultures were so different that European descriptions were, for the most part, vague, misleading or inaccurate. Although the accounts are valuable references, we cannot depend on them.

On land, a lot of Aboriginal archaeological work has been undertaken. This has provided important insight into the immense antiquity of Aboriginal Australia – establishing a date of at least 60,000 years. Where this work is in partnership with Aboriginal people and draws upon their oral histories, it helps society as a whole to better understand the enormous achievements and endurance of Aboriginal cultures.

Underwater sites have the potential to reveal much more. Above water, we can only look at the places where people moved when the sea rose or where water never covered the land. Furthermore, most organic and inorganic materials can survive better underwater than on land! Although the sea destroys when waves hit the shore, it becomes very protective once material is on the seabed.

© UNESCO/D.Nutley

Fish trap, Darling River (Australia).

Only limited studies have been undertaken in Australia. Artefact and habitation sites have been recorded in Lake Jasper, Western Australia, by Dr Charles Dortch and the Western Australian Museum in the late 1980s. In 2007 an archaeological survey (by the author, James Wheeler and Cosmos Coroneos, assisted by volunteers from the Underwater Research Group) searched for potential underwater rock shelters in a protected estuary south of Sydney. In this area, numerous rock overhangs above water had been used as rock shelters. Under water, rock overhangs were found but it was not possible, within the scope of this survey, to confirm whether these had been used as shelters. What the study did show was that their form was consistent with their above water counterparts.

Meticulous archaeological investigation will be required to unveil such sites, hidden for tens of thousands of years – and the task will not be easy. Anyone who has searched for shipwrecks knows how difficult it is to even find large iron naval vessels. Looking for artefact scatters, rocks quarried to make stone tools, hearths, stone fish traps and other such vestiges even in shallow water will be difficult. However, if offshore peat beds from old submerged lagoons have survived, these may hold the key. Perhaps a core sample from an offshore drilling operation will one day open up a whole new chapter on Australia's Aboriginal past?

David Nutley,
Department for Environment & Heritage, Australia

They do not draw crowds and guide books ignore them, but they have old stories to tell. No need for special equipment to explore the hulks of Forton Lake, near Portsmouth in the United Kingdom – you simply wait for low tide. These modest, easily accessible shipwrecks are stimulating memory and initiative in the local community.

THE HULKS OF FORTON LAKE

© Daniel Karmy

You need only Wellington boots to go explore the Forton Lake shipwrecks.

The Mary Rose, favourite ship of King Henry VIII and now one of the world's most famous wrecks, sank in 1545, defending England against a massive French invasion. The wreck was discovered in the late 1960s, over 400 years later, using state-of-the-art sonar and divers working in near-zero visibility. It was brought to the surface in 1982 and is now housed in a purpose-built museum in Portsmouth, United Kingdom, a few kilometres from where it sank, attracting some 600,000 visitors a year.

Meanwhile, across the harbour in Forton Lake, the less glamorous wrecks of a 1950s Gosport to Portsmouth ferry, the Vadne , the Second World War minesweeper M293, and a scrapped chain ferry from the Isle of Wight can be reached on foot at low tide by anyone with a good pair of boots and are never going to be on a tourist itinerary. Yet they, and some 24 other wrecks in Forton Lake, are also part of the UK's underwater heritage and have recently been the focus of a three-year archaeology project, with local volunteers working alongside professionals.

Nothing earth-shattering, but...

In fact, Forton Lake is not really a lake, but a tidal inlet off Portsmouth harbour, now flanked on two sides by housing estates. "At high tide, some of the wrecks are completely submerged, while others are partially visible," says Mark Beattie-Edwards, Programme Director of the Nautical Archaeology Society (NAS). "They can be seen by anyone riding past on their bikes or on the ferry, on their way to work." But this made the site a perfect candidate for a community-based heritage project. In 2006 the NAS and the Hampshire and Wight Trust for Maritime Archaeology (HWTMA), both based in Portsmouth, were awarded a grant to carry out the research, using volunteers to help excavate the wrecks, take measurements and gather data. With fieldwork completed last year, the organisers are now writing their final report, preparing an exhibition and a book.

Starting with a survey conducted ten years earlier, the project teams identified 27 wrecks, including World War II landing craft, minesweepers and gunboats, a sailing barge and two ferries. "These wrecks aren't earth-shattering discoveries," admits Beattie-Edwards, "and none are either worth preserving or restoring under the terms of UK legislation on scheduled monuments. But they do show that heritage can be what's on your doorstep. What, for one person, might be considered an eyesore is, for someone else, of historical interest."

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© Daniel Karmy

Some wrecks are submerged at high tide; others remain visible.

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Indeed, the UK National Register of Historic Vessels currently has no examples of some of the kinds of vessel found in Forton Lake, such as the minesweeper. And, unlike the Mary Rose, local people remember playing on the wrecks and have been contributing valuable eye-witness information to the project, as well as old photographs.

A chance for amateur archaeologists

Volunteers, including some sixth form students at St Vincent College, which overlooks Forton Lake, received training in survey methods from NAS, both in the classroom and on the site. Dan Karmy, a young local amateur photographer, joined in the fieldwork as a volunteer in the summer of 2008. "I used to go fishing a lot at Forton Lake," he says, "but I didn't really take much notice of the wrecks. After working on the project, I now know things that I wouldn't have had a clue about before." Since the project started he has taken over 700 photos of the Lake and its wrecks (http://www.flickr.com/photos/dank147/).

"I am fascinated by Gosport's history" says a contributor to the World Naval Ships Forums , "but the wreck of the minesweeper is a particular favourite. I grew up living in Grove Road and, at that time, it was visible from my bedroom window." His memories of climbing on the wreck as a child have provided valuable detail for historians, while a local 90-year-old even served on a sister ship during the war. Others have charted the demise of a 1950s Gosport-Portsmouth ferry, the Vadne, which, after it had been taken off service, was used as the clubhouse for the local yachting club, before being left to rust in the mud, its funnel gathering graffiti.

"Part of the Forton Lake initiative was to encourage people to set up their own projects," explains Mark Beattie-Edwards. Accessible remains like these can be ideal for the amateur archaeologist. They can be visited whenever tidal conditions permit, without the need for expensive boat hire or special diving conditions. And they can yield some surprises. When another project by the Hampshire and Wight Trust for Maritime Archaeology investigated the remains of what, at first, was thought to be a simple coaster on the banks of the nearby River Hamble, it turned out to be the wreck of an elegant schooner, the Norseman. Built in 1881 in the USA for a multi-millionaire, it fell on hard times and was converted to a floating brothel, then a houseboat, before going up in flames at Swanwick.

Peter Coles,
British journalist

© Daniel Karmy

This wrecked wooden boat has become part of the local scenery.

Underwater museums and parks, replicas and digital reconstructions of wrecks are all ways to encourage the public to discover our underwater cultural heritage without damaging it. Some cost more than others, but they may also be more magical. Take the museum in the Bay of Alexandria, for example.

© D.Frka/Courtesy of the Ministry of Culture, Croatia

Greek bronze representing a young athlete, Vele Island (Croatia).

VISITING SUBMERGED TREASURES

Stonehenge, Chartres cathedral, the pyramids of Egypt, are all evidence of the power of human creativity. They need to be protected and preserved, but not locked away, so that everyone can marvel at their heritage.

This is not a great problem on land. But how can the public discover the ruins of the Alexandria lighthouse, or Cleopatra's palace, the wrecks of Greek and Roman ships, or the sphinxes and other statues found beneath the waters of the Bay of Alexandra?

This is one of the purposes of underwater archaeology, a discipline that requires good diving skills and expensive equipment. But it takes a great number of dives and sophisticated technology - and therefore a lot of money - to bring treasures to the surface, or to decide to leave them where they are and preserve them.

After all, if these wooden wrecks have survived for centuries, it is precisely because the darkness and lack of oxygen in deep water have allowed their preservation. Once exposed to the air, the saturated remains have to be treated to stop them deteriorating. "Conservation takes a lot of work, over many years, and is very expensive," says Florian Huber, underwater archaeologist at the University of Kiel (Germany).

Irena Radi-Rossi, one of his Croatian colleagues, is a specialist in Roman shipwrecks carrying large cargoes of amphorae. "When you raise that number of objects," she explains, "you run into all sorts of problems, like storage, conservation, treatment and exhibition space." And, on some sites, the amphorae have melded with the seabed. "Any attempt to free them could easily end up by destroying some of the finds."

The easiest solution, concludes Huber, is to leave the sunken object where it is. This is what the Convention on the Protection of the Underwater Cultural Heritage, adopted in 2001 by the UNESCO General Conference, recommends. But how can these submerged treasures then be made accessible to the public?

Underwater museums

The ideal solution would be to build an underwater museum that could be visited without even getting one's feet wet. No need, then, to be able to dive to admire the exhibits in situ. But building such a museum

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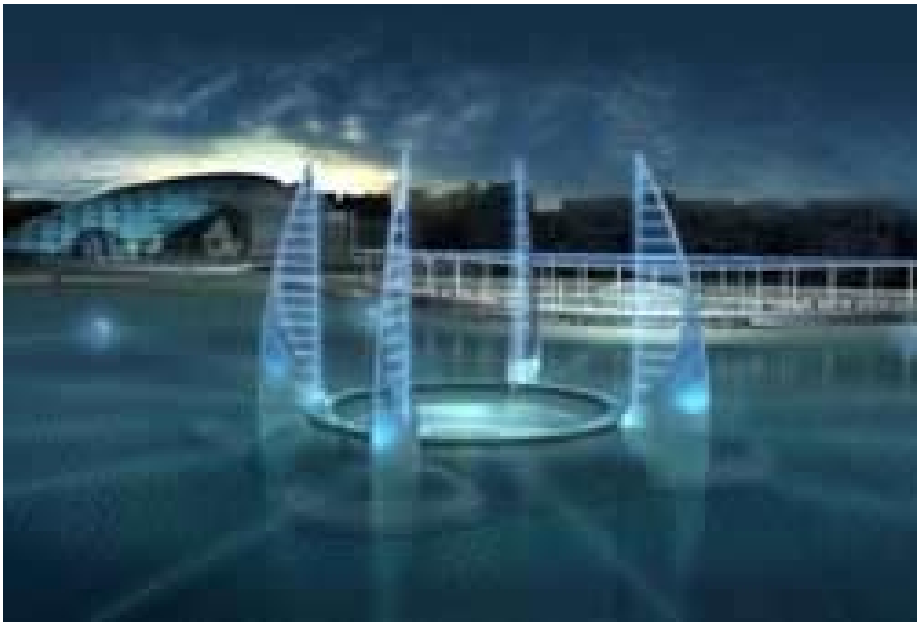

© Jacques Rougerie Creation

Plans for an underwater museum in the Bay of Alexandria, by French architect Jacques Rougerie.

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is itself a highly complex and costly technological feat. The question is, how complex and, above all, how expensive?

"Finding answers to these questions was one of the aims of a feasibility study for an underwater museum in the Bay of Alexandria," explains Ulrike Koschtial, of UNESCO's Division of Cultural Objects and Intangible Heritage. Launched by the Egyptian authorities with support from UNESCO, the pilot project is under the direction of French architect Jacques Rougerie. Not lacking imagination, he envisages a museum complex in two major parts. Not far from the new library of Alexandria visitors will enter the first part, above ground, with its glass walls. They will then go deep underground via a tunnel until they reach a 40-metre diameter underwater terrace, in the centre of the Bay. There, seven metres down, behind glass windows, they will be able to admire the many finds dating back to ancient Alexandria. The museum would boast a total surface area of 22,000 square metres and receive some three million visitors a year.

Apart from its probably prohibitive cost, this captivating project would have to overcome other obstacles, like the Bay's pollution. Before visitors can appreciate the treasures in their underwater setting, a way has to be found to purify the seawater and keep it clear, while not hampering the operation of the port. Another challenge is that Egypt is in a seismically active area, with the Red Sea lying on a fault line between the Arabian and African tectonic plates.

Another underwater museum is already being built. At Baiheliang (China), there is a 1600 metre-long ridge, on which changes in the level of the Yangtze River have been recorded for 1200 years. Until now, the 'White Heron Ridge', as it is called, has only partially been submerged by the river. But, when the Three Gorges dam is completed, it will be completely under water. So, in the 1990s, the Chinese authorities decided to preserve the Baiheliang inscriptions by making them part of an underwater museum. This should have been finished in 2007, but is taking longer than planned.

Other solutions

While waiting for these underwater museums to open, the public can enjoy 'underwater parks'. But for this, the visitor needs to be able to dive. Sarah Arenson, a historian from the University of Haifa, is behind one such project in Caesarea, the ancient port city on the Mediterranean coast of Israel, constructed by King Herod to honour the Emperor, Augustus Caesar, in 10 B.C. Some of the problems that still have to be solved in Alexandria are familiar to her. "In the case of Caesarea, there was no option of recovery," she explains, "as the site is mainly composed of architectural remains." But, she adds, "the prospects of damage to the site are slight. The biggest danger comes from use of the area by fishermen and pleasure craft." The only way to prevent this, she says, is through legislation, by prohibiting fishing and boating in the area. But, as for visibility, "the only answer is prayer," she smiles. Meanwhile, pollution is minimized by periodical cleaning by volunteers, attracted by special events and competitions.

For Daniel Zwick, of Deguwa, the German society for nautical archaeology, underwater parks are a good way to make underwater heritage accessible, while preserving it. "The routes followed by divers are usually designed to avoid exposed relics, which could be damaged by the movement of scuba fins, for example."

Humans are still a threat, though.

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There are always a few black sheep masquerading as divers who come to pillage the sites. And, to enable the public to gain a better appreciation of these sites, Florian Huber has set up a study group for maritime and limnic (freshwater) archaeology (AMLA), which offers regular courses for divers. "It is very difficult to protect shipwrecks," he says. "The only way is to raise public awareness." Even so, fragile relics can also be damaged by deep sea fishing nets, storms and even the naval shipworm (Teredo navalis), a tiny mollusc that bores into submerged wood.

This is why other approaches are being used. One of the most impressive underwater trails, anywhere, takes visitors to the oldest known shipwreck, the Uluburun, which sank over 3000 years ago, off the south-west coast of Turkey. But, since 2006, divers have been unable to explore the original. The archaeological park they come to is, in fact, next to the original site, and exhibits an exact replica, named Uluburun III.

"Uluburun III was built on dry land," says underwater archaeologist Guzden Varinliogu, "with a fake cargo of gold and amphorae. It was then laid on the seabed following the archaeological layout of the original Uluburun wreck." The original is now in the museum for underwater archaeology in Bodrum.

© Sacit Uluirmak

Uluburun III is an identical copy of the Uluburun shipwreck.

Even less harmful to underwater treasures are virtual visits, where dives are simulated on a screen. This is the aim of the European Venus project, which digitally reconstructs wrecks in three dimensions. Data from sonar scans of the site are combined with underwater photography to provide a realistic simulation of the sunken object, with the same resolution used in the latest computer games. This is one way to allow everyone to see these underwater relics. "It is perfectly clear that not everybody can reach such sites," says Irena Radi-Rossi. "But you can always create virtual reality spaces on nearby land and offer some of the emotion, pleasure and adventure of diving to people who can't dive."

Jens Lubbadeh,
journalist for
Der Spiegel Online, Germany,
correspondent for
the UNESCO Courier

An underwater museum in the Bay of Alexandria

"It will be a revolutionary museum because for the first time we'll be able to visit an underwater museum without getting our feet wet!
A feasibility study on the subject is in preparation and a technical management committee led jointly by UNESCO and Egypt will proceed with its evaluation and recommend procedure. Egypt has assigned the study to Jacques Rougerie from France."

Françoise Rivière,
UNESCO Assistant Director-General for Culture

BENEATH THE WATER, HERITAGE IN SEARCH OF INTERNATIONAL PROTECTION

© Wikimedia Commons/N. Rüfli

Divers in a cenote in Mexico.

The UNESCO Convention on the Protection of the Underwater Cultural Heritage is the first legal instrument to safeguard underwater archaeological sites on an international scale, providing protection against treasure-hunters, while regulating international cooperation.

It was a turning point in the history of attempts to safeguard shipwrecks and other submerged monuments when, on 2 January 2009, the UNESCO Convention on the Protection of the Underwater Cultural Heritage entered into force. Adopted by Member States in 2001, this is the only convention that is specific to the underwater cultural heritage. Even so, it neither regulates the ownership of heritage nor changes maritime sovereignty zones. Its aim is to combat looting and extend to our underwater heritage the same protection offered to sites on dry land. "From now on, it will be possible to offer legal protection to the memory of humanity that is buried at the bottom of the oceans, lakes and rivers, thus curtailing the growing illicit trade by looters," said UNESCO's Director-General, Koïchiro Matsuura.

Archaeologists have been waiting a long time for international legislation such as this. "The 2001 Convention is heaven's gift for underwater archaeologists," says Robert Grenier, a well-known Canadian underwater archaeologist. This new instrument should also enable the public to get to know this little-known aspect of our heritage, which is so much more than a few shipwrecks at the bottom of the sea. Untold treasures lie in the depths, sometimes for thousands of years. And, while Atlantis was probably just a myth, entire stone-age landscapes, painted caverns and sacrificial sites are yielding their amazing secrets day after day. Take, for example, the 'cenotes' of Yucatan (Mexico), natural sinkholes that hold traces of Mayan sacrifices. The Chichen Itza cenote contained no fewer than 120 sacrificed bodies.

A minefield

The UNESCO convention is, however, entering a minefield when it is applied to safeguard this fragile heritage. While land-based heritage is subject to increasing protection, the looting of our underwater heritage is growing at an alarming rate, and national legislation is very patchy. Treasure hunters and commercial enterprises, attracted by profit, are deserting sites on dry land for deep-sea archaeology. Just one example is their interest in the precious cargoes of the caravels and carracks, these jewels of the Portuguese fleet that plied the spice routes in the 17th century. Commercial exploitation of their wrecks off the coast of Mozambique, for example, is threatening the only remaining historical evidence of their construction, as most of the documents from the era

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Wreck of the Thistlegorm, sunk by a German bomber in the Read Sea, during World War II.

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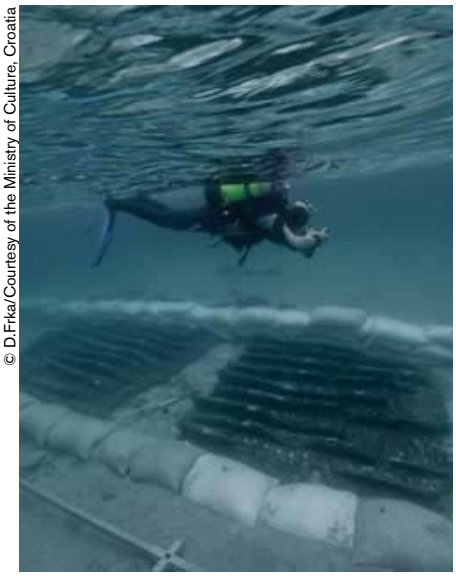
were destroyed in the 1755 Lisbon earthquake.

Faced with protests from archaeologists and the suspicions of the authorities when approached for licenses to explore, private companies looking for wrecks are increasingly proclaiming the scientific interest of their research. But it is almost impossible to practice genuine archaeology when the real motive is profit, and shareholders, not an informed public, are behind the work. As the celebrated Portuguese archaeologist, Francisco Alves, put it, "the archaeologist's work is often like that of a detective. But what would we think of a detective who sells the victim's watch to pay for his investigations?"

Confronted with destruction and looting, the UNESCO Convention has added a series of rules in its Annex regarding archaeological exploration, which aim to act as an added safeguard and directive for national authorities. By imposing ethical norms of protection, it should eventually eradicate purely commercial operations.

The Convention has also been set up to provide a legal safeguard and to monitor the protection of sites, which is probably its most delicate task. In international waters, States have, with some exceptions, only a limited jurisdiction, which often restricts the application of national regulations to their own nationals or to vessels flying their flag. Every time a commercial enterprise from a given country sets its sights on some article that another State thinks is valuable, international cooperation becomes crucial for its protection. Hence the value of the Convention, which aims to regulate and improve the conditions of this cooperation.



© D.Frka/Courtesy of the Ministry of Culture, Croatia

Roman wreck near Pakostane (Croatia), protected by sand bags.

Other threats, other solutions

Commercial excavations are not the only threat hanging over the relics located at the bottom of the seas, even if they are largely the reason behind the Convention. Foolhardy tourists looking for souvenirs, the construction of ports and oil pipelines, mineral prospecting and trawler fishing are also threats.

But satisfactory solutions can sometimes be found. Nord Stream AG, the company that built a gas pipeline in the Baltic Sea, recently had to open a breach in an ancient barrage made out of sunken Swedish ships, preserved in the Bay of Greifswald, in northern Germany. This barrage dates back to the Great Northern War when, in 1715, the Swedish navy scuttled some twenty ships, each around 15 metres long, in order to protect the bay. The construction company paid for the costs of archaeological research and salvage, demonstrating that it is possible to find a balance between the need to safeguard the past and the needs of the present. The UNESCO Convention has the advantage of inviting its States Parties to find solutions that limit damage to the underwater heritage.

There remain, of course, the inevitable threats posed by nature, such as erosion, tides, storms, tsunamis, etc. The 2001 Convention invites national governments to take measures to prevent or to reduce the impact of such phenomena, by fencing off threatened sites, building cages, or covering them in sand.

UNESCO and the European Union have carried out several studies on the effects of climate change on cultural heritage. And a project has also just been launched with the Sovrintendenza del Mare, in Sicily, to investigate the possibility of preventing the destruction of coastal and underwater sites by earthquakes, under the framework of the Convention. The task is enormous, but the Convention has the whole future before it.

Ulrike Koschtial
(UNESCO)

Catherine Cesarski

"This is the golden age of astronomy"

Four hundred years ago, Galileo looked at the stars through a telescope for the first time. To celebrate this event, the United Nations proclaimed 2009 the International Year of Astronomy (IYA) and named UNESCO its lead agency. In honour of the Year, the *Courier* is publishing an interview with Catherine Cesarsky, emeritus research director at the French Atomic Energy Commission (CEA), researcher at the Paris Observatory, and president of the International Astronomical Union (IAU) since 2006.

Interview by Pierre Gaillard (UNESCO).

© UNESCO/ Danica Bjeljac

Catherine Cesarsky at the press conference organized by UNESCO for the launch of the International Year of Astronomy, on 15 January 2009.

What is the purpose of astronomy?

Astronomy is the science that allows humanity to try to answer questions it has always asked. Where do we come from? Where are we going? Are we alone in the universe? Using scientific means, we try to answer these questions, to understand how the universe works, how the universe came into being, along with its galaxies, stars and planets. To know if there are other planets in the universe and if they resemble ours. And, in a while, we will probably try to find out if they are inhabited by living beings, maybe even made of cells as we are.

How is astronomy faring today?

This the golden age of astronomy, thanks in large part to great advances in technology. Astronomy is a science that uses technology to the maximum and makes it advance as well, always going to the extremes of electronics, optics and mechanics.

Recent advances allow for methods of observation far superior to those we had in the past. For a long time, we studied only nearby galaxies that we call our near universe. Now we have much more sensitive telescopes and instruments, allowing us to see sources that are weaker. Usually, these sources are weaker because they are simply far away. And when we observe a galaxy that is very far away, since light takes a very long time to reach us, we see the galaxy as it was when it emitted the light that we are receiving. Today, we think that the universe is around 13.6 billion years old. We are able to observe galaxies that are barely younger than the universe.

What new advances does astronomy hold for coming years?

We are currently experiencing the first discoveries of galaxies that already existed very early on in the life of the universe. For the moment, we are discovering a few: the brightest. Later, with even more sensitive instruments, we will be able to understand how they were created, if they resembled the galaxies as they are now. We will be able to study their properties, which for me is something very interesting. We are also in the middle of precisely working out cosmological parameters, those that govern the expansion of the universe, its creation at the time of the

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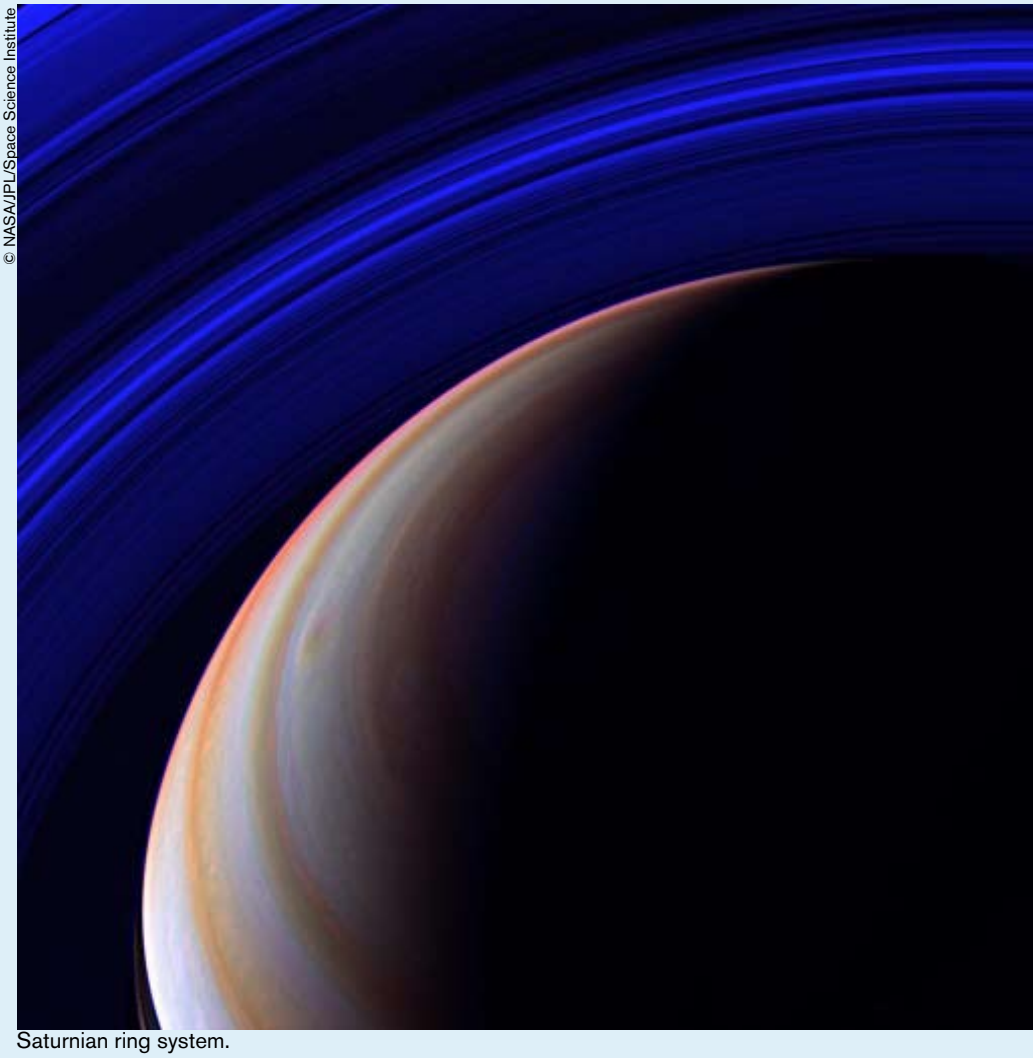
Big Bang. There as well, we have a lot of potential progress. Finally, there are extra-solar planets that we began to discover a bit more than ten years ago because of their indirect effects. Now we know a few hundred. We know better and better how to find ones that resemble Earth, and soon we will study their characteristics.

Have all these developments changed the profession of the astronomer?

The day-to-day work of an astronomer has nothing to do with what it used to be. We have essentially two types of observational astronomy: astronomy on the ground and in space. It takes a long time to develop instruments for space, they must be perfect, we cannot afford to make any mistakes. Just proposing and carrying out an instrument project takes 15 years. The instrument is then taken on board a satellite and, to explore the solar system, another eight to ten years may be required before the probe reaches its destination. It takes a lot of patience!

And astronomers who carry out their observation on the ground use telescopes that no longer have anything to do with those of our predecessors. We now have telescopes with diameters of eight to ten metres and we are studying new ones with diameters in the order of 30m, and even 40m and more. Astronomers are no longer sat in front of their telescope, in an ice-cold dome, like in the past: with one eye glued on the star to make sure it does not leave the field. They now work in front of computers and do everything through remote control.

We are no longer satisfied with just visible astronomy. Between the ground and space, we scrutinize all wavelengths, from radio waves to gamma rays, which give us a much more complete view.



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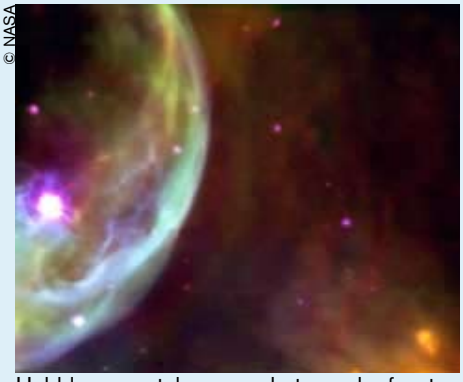
Saturnian ring system.

What will the International Year of Astronomy achieve?

The International Year of Astronomy was invented by the International Astronomical Union and – fortunately – UNESCO joined us very quickly! Our goal is to share with the rest of the world the wonder we feel as astronomers, faced with the mysteries of the universe.

We want all countries in the world – many of which have already created programmes – to get involved. And we want the public, the widest possible public, to be able to take part. By the end of the year, we would like everyone on Earth to have spent at least a short while with their attention turned to the sky. Or at least to have read something on the most recent discoveries, or reflected on our position in the universe.



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Hubble space telescope photograph of a star in our galaxy.

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